CLAIMS:

1. A method of reducing noise due to thermally activated spin waves in a magnetoresistive element including a free layer, a reference layer, and a spacer layer, the spacer layer positioned between the free layer and the reference layer, the method comprising:

pinning a magnetization of the reference layer in a fixed direction; and

directing a spin polarized current perpendicular to a plane of the free layer, reference layer, and spacer layer, such that the current exerts a spin momentum transfer torque on localized electron spins to reduce noise due to thermally activated spin waves.

2. The method of claim 1, wherein the spin polarized current has a direction such that the spin momentum transfer torque opposes an intrinsic damping torque in the free layer.

3. The method of claim 1, wherein directing a spin polarized current comprises passing a current through a ferromagnetic material, the ferromagnetic material acting as an electron spin filter that polarizes conduction electrons in the current.

4. The method of claim 1, wherein pinning a magnetization of the reference layer comprises exchange coupling an antiferromagnet to the reference layer.

5. The method of claim 1, wherein pinning a magnetization of the reference layer comprises coupling a permanent magnet to the reference layer.

6. The method of claim 1, wherein a magnetization of the free layer is parallel to the magnetization of the reference layer in a quiescent state.

7. The method of claim 1, wherein a magnetization of the free layer is antiparallel to the magnetization of the reference layer in a quiescent state.

8. The method of claim 1, wherein the spacer layer is a nonmagnetic metallic spacer layer.

9. The method of claim 8, wherein a thickness and resistivity of the nonmagnetic metallic spacer layer are variable to adjust a magnitude of the spin momentum transfer torque.

10. The method of claim 8, wherein the nonmagnetic metallic spacer layer includes paramagnetic impurities to adjust a magnitude of the spin momentum transfer torque.

11. The method of claim 1, wherein the reference layer is a permanent magnet.

12. The method of claim 1, wherein the reference layer is a layer within a synthetic antiferromagnet.

13. A magnetoresistive (MR) element comprising:

a reference layer having a magnetization pinned in a fixed direction;

a free layer having a magnetization which rotates in response to an external magnetic field;

a spacer layer positioned between the reference layer and the free layer; and

a circuit for providing a current perpendicular to a plane of each of the layers in a direction that causes a reduction in thermally activated spin wave noise.

14. The MR element of claim 13, wherein the current is a spin polarized current that has a direction such that spin momentum transfer torque opposes an intrinsic damping torque in the free layer.

15. The MR element of claim 14, wherein the current is spin polarized by passing the current through a ferromagnetic material, the ferromagnetic material acting as an electron spin filter that polarizes conduction electrons in the current.

16. The MR element of claim 13, wherein the spacer layer is a nonmagnetic metallic spacer.

17. The MR element of claim 16, wherein a thickness and resistivity of the nonmagnetic metallic spacer layers are variable to adjust a magnitude of the spin momentum transfer torque.

18. The MR element of claim 13, wherein the spacer layer is a tunnel barrier.

19. The MR element of claim 13, wherein the reference layer is a soft ferromagnetic layer exchange coupled to an antiferromagnet.

20. The MR element of claim 13, wherein the reference layer is a soft ferromagnetic layer exchange coupled to a permanent magnet.

21. The MR element of claim 13, wherein the reference layer is a permanent magnet.

22. The MR element of claim 13, wherein the circuit for providing a current perpendicular to a plane of each of the layers comprises an external current source.

23. A magnetoresistive (MR) element having reduced thermally activated spin wave noise, the MR element comprising:

a first reference layer having a magnetization pinned in a fixed direction;

a first free layer having a magnetization which rotates in response to an external magnetic field;

a second free layer having a magnetization which rotates in response to an external magnetic field;

a second reference layer having a magnetization pinned in a fixed direction;

a nonmagnetic layer positioned between the first free layer and the second free layer;

a first spacer layer positioned between the first reference layer and the first free layer;

a second spacer layer positioned between the second free layer and the second reference layer; and

a circuit for providing a current perpendicular to a plane of each of the layers such that the current exerts a spin momentum

transfer torque on localized electron spins in the free layers, thereby reducing noise in the free layers.

24. The MR element of claim 23, wherein the spacer layers are nonmagnetic metallic spacer layers.

25. The MR element of claim 24, wherein a thickness and resistivity of the nonmagnetic metallic spacer layers are variable to adjust a magnitude of the spin momentum transfer torque.

26. The MR element of claim 24, wherein paramagnetic impurities are included in the nonmagnetic metallic spacer layers to adjust a magnitude of the spin momentum transfer torque.

27. The MR element of claim 23, wherein the nonmagnetic layer is a tunnel barrier.

28. The MR element of claim 23, wherein each reference layer is a soft ferromagnetic layer exchange coupled to an antiferromagnet.

29. The MR element of claim 23, wherein each reference layer is a soft ferromagnetic layer exchange coupled to a permanent magnet.

30. The MR element of claim 23, wherein each reference layer is a permanent magnet.

31. The MR element of claim 23, wherein the magnetization of the first free layer and the magnetization of the second free layer are biased orthogonally with respect to each other.

32. The MR element of claim 31, wherein the free layers are biased orthogonally with respect to each other using an electromagnet.

33. The MR element of claim 23, wherein the circuit for providing a current perpendicular to a plane of each of the layers comprises an external current source.

34. A method of sensing magnetically encoded information from a magnetic storage medium, the method comprising:

causing relative motion of the storage medium with respect to a current perpendicular to plane (CPP) magnetoresistive (MR) element;

directing a spin polarized current through the CPP MR element in a direction which exerts a spin momentum transfer that reduces noise due to thermally activated spin waves; and

detecting a voltage across the CPP MR element.